

**PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA
DOCKET NO. 2005-1-E
DIRECT TESTIMONY OF
PROGRESS ENERGY CAROLINAS, INC.**

WITNESS DEWEY S. ROBERTS II

1 **Q. Mr. Roberts will you please state your full name, occupation, and address?**

2 **A.** My name is Dewey S. Roberts II (Sammy). I am employed by Progress Energy
3 Carolinas, Inc. as Manager – Power System Operations in the System Planning and
4 Operations Department. My business address is 3401 Hillsborough St, Raleigh,
5 North Carolina.

6 **Q. Please summarize briefly your educational background and experience.**

7 **A.** I graduated from North Carolina State University in 1987 with a B.S. Degree in
8 Electrical Engineering. I also obtained a Master of Science Degree in Electrical
9 Engineering from North Carolina State University in 1990 and a Master of
10 Business Administration Degree from North Carolina State University in 2004. I
11 am a member of the Institute of Electrical and Electronics Engineers (IEEE). I am
12 also a registered Professional Engineer in the state of North Carolina and I am
13 recognized as a Certified System Operator by the North American Electric
14 Reliability Council. I joined the Company in 1990 and have held several
15 engineering and management positions in Nuclear Engineering, Engineering and
16 Technical Services, System Operator Training, Portfolio Management,
17 Transmission Services, and Power System Operations. These positions include:
18 Project Engineer, Manager - Transmission Services, and Manager-Power System
19 Operations. In November 2003, I assumed the position of Manager – Power
20 System Operations in the Power System Operations Section of Progress Energy

1 Carolinas, Inc. System Planning and Operations Department. In my current
2 position, I am responsible for managing safe, reliable, economic and NERC/FERC
3 compliant operations for the Progress Energy – Carolinas' eastern and western
4 control area power systems.

5 **Q. What is the purpose of your testimony here today?**

6 **A.** The purpose of my testimony is to review the operating performance of the
7 Company's nuclear, fossil, combined cycle, combustion turbine, and hydroelectric
8 generating facilities during the period of January 1, 2004 through March 31, 2005.

9 **Q. Describe the types of generating facilities owned and operated by the**
10 **Company.**

11 **A.** The Company owns and operates a diverse mix of generating facilities consisting
12 of four (4) hydro plants, forty seven (47) combustion turbines, three (3) combined
13 cycle units, nineteen (19) fossil steam generating units, and four (4) nuclear units.

14 **Q. Why does the Company utilize such a diverse mix of generating facilities?**

15 **A.** Each type of facility has different operating and installation costs and is generally
16 intended to meet a certain type of loading situation. In combination, the diversity
17 of the system, in conjunction with power purchases made when doing so is more
18 cost-effective than using a Company owned generating unit, allows the Company
19 to meet the continuously changing customer load pattern in a reasonable, cost-
20 effective manner. The combustion turbines, which have relatively low installation
21 costs but higher operating costs, are intended to be operated infrequently. They
22 also provide resources that can be started in a relatively short time for emergency
23 situations. In contrast, the large coal and nuclear steam generating plants have

1 relatively high installation costs with lower operating costs, and are intended to
2 operate in a manner to meet the constant level of demand on the system. Based on
3 the load level that the Company is called on to serve at any given point in time, the
4 Company selects the combination of facilities which will produce electricity in the
5 most economical manner, giving due regard to reliability of service and safety. This
6 total cost optimization approach provides for overall minimization of the total cost
7 of providing service.

8 **Q. Please elaborate on the intended use of each type of facility the Company uses**
9 **to generate electricity.**

10 **A.** As a general rule, peaking resources such as combustion turbines, are constructed
11 with the intention of running them very infrequently, i.e., only during peak or
12 emergency conditions. Therefore, as a rule, they have a very low capacity factor,
13 generally less than 10%. Because combustion turbines can be started quickly in
14 response to a sharp increase in customer demand, without having to continuously
15 operate the units, they are very effective in providing reserve capacity.
16 Intermediate facilities are intended to operate more frequently and are subject to
17 daily load variations. Because these facilities take some time to come from a cold
18 shut down situation, they are best utilized to respond to the more predictable
19 system load patterns. Additionally, these plants, located across the Company's
20 service territory, contribute to overall system reliability. As a rule, they operate
21 with capacity factors in the range of 20% to 60%. The Company's intermediate
22 facilities are predominately our older coal plants and combined cycle units.
23 Baseload facilities are intended and designed to operate on a near continuous basis

1 with the exception of outages for required maintenance, modifications, repairs,
2 major overhauls, or for refueling in the case of nuclear plants. These plants are
3 traditionally called on to operate in the 60% and greater capacity factor range. The
4 Company's four nuclear units and four larger coal units constitute the Company's
5 baseload facilities.

6 **Q. How much electricity was generated by each type of Company generating unit**
7 **in the 12 month period ending December 31, 2004 and in the first three**
8 **months of 2005?**

9 **A.** For the twelve-month period ending December 31, 2004, the Company generated
10 60,235,436 megawatt hours of electricity. Nuclear plants generated 45.78%, fossil
11 plants generated 49.69%, combined cycle and combustion turbine units generated
12 3.20%, and hydroelectric units generated 1.33% of the total amount of electricity
13 generated.

14 For the first quarter of 2005, the Company generated 15,423,789 megawatt hours of
15 electricity. Nuclear plants generated 44.86%, fossil plants generated 50.22%,
16 combined cycle and combustion turbine units generated 3.45%, and hydroelectric
17 units generated 1.46% of the total amount of electricity generated.

18 **Q. Were there any increases in your generating capability during period covered**
19 **by your testimony?**

20 **A.** Yes. During the Brunswick 1 Spring 2004 refueling outage, modifications were
21 completed on the final phase of a power uprate project. After testing and
22 performance observations during the year, the Maximum Dependable Capacity of

1 Brunswick 1 was increased by 66 megawatts effective January 1, 2005. This brings
2 the net rating of the unit to 938 megawatts.

3 **Q. How does the Company ensure that it operates these types of generating**
4 **facilities as economically as possible?**

5 **A.** The Company has a central Energy Control Center which monitors the electricity
6 demands within our service area. The Energy Control Center regulates and
7 dispatches available generating units in response to customer demand in a least cost
8 manner. Sophisticated computer control systems match the changing load with
9 available sources of power. Personnel at the Energy Control Center, in addition to
10 being in contact with the Company's generating plants, are also in communication
11 with other utilities bordering our service territory. In the event a plant is suddenly
12 forced off-line, the interconnections with neighboring utilities help to ensure that
13 service to our customers will go uninterrupted. Additionally, the interconnections
14 allow us access to the unloaded capacity of neighboring utilities so that our
15 customers will be served by the lowest cost power available through inter-utility
16 purchases.

17 **Q. How does the Company determine when it needs to purchase power?**

18 **A.** The Company is constantly reviewing the power markets for purchase
19 opportunities. We buy when there is reliable power available that is less expensive
20 than the resources we currently have or are considering building. This review of the
21 power markets is done on an hourly, daily, weekly, monthly, yearly, and multi-year
22 basis.

1 **Q.** **During the review period January 1, 2004 through March 31, 2005, did the**
2 **Company prudently operate its generating system within the guidelines**
3 **discussed in regard to the three types of facilities?**

4 **A.** Yes. Two different measures are utilized to evaluate the performance of generating
5 facilities. They are equivalent availability factor and capacity factor. Equivalent
6 availability factor refers to the percent of a given time a facility was available to
7 operate at full power if needed. Capacity factor measures the generation a facility
8 actually produces against the amount of generation that theoretically could be
9 produced in a given time period, based on its maximum dependable capacity.
10 Equivalent availability factor describes how well a facility was operated, even in
11 cases where the unit was used in a load following application. Our combustion
12 turbines (including the Richmond County Combined Cycle Unit) averaged 91.45%
13 equivalent availability and a 5.86% capacity factor for the twelve-month period
14 ending December 31, 2004. Our combustion turbines (including the Richmond
15 County Combined Cycle Unit) averaged 90.58% equivalent availability and a
16 6.59% capacity factor for the first quarter of 2005. These performance indicators
17 are consistent with the combined cycle and combustion turbine generation intended
18 purpose. The generation was almost always available for use, but operated
19 minimally. Our intermediate (or "cycling") coal fired units, had an average
20 equivalent availability factor of 91.73% and a capacity factor of 58.67% for the
21 twelve-month period ending December 31, 2004. Our intermediate (or cycling)
22 coal fired units, had an average equivalent availability factor of 92.70% and a
23 capacity factor of 68.17% for the first quarter of 2005. Again, these performance

1 indicators are indicative of good performance and management. Our fossil baseload
2 units had an average equivalent availability of 91.73% and a capacity factor of
3 67.59% for the twelve-month period ending December 31, 2004. Our fossil
4 baseload units had an average equivalent availability of 95.23% and a capacity
5 factor of 69.63% for the first quarter of 2005. Thus, the fossil baseload units were
6 also well managed and operated. The Company's nuclear generation system
7 achieved a net capacity factor of 92.9% for the twelve-month period ending
8 December 31, 2004. Excluding outage time associated with reasonable outages,
9 such as refueling, the nuclear generation system's net capacity factor for this period
10 rises to approximately 99.7%. For the twelve-month period ending March 31,
11 2005, the Company's nuclear generation system achieved a net capacity factor of
12 93.0%. Excluding outage time associated with reasonable outages, such as
13 refueling, the nuclear generation system's net capacity factor for this period rises to
14 approximately 101.9%. Therefore, pursuant to S.C. Code Ann. § 58-27-865(F),
15 since the adjusted capacity factor exceeds 92.5%, the Company is presumed to
16 have made every reasonable effort to minimize the cost associated with the
17 operation of its nuclear generation system.

18 **Q: How did the performance of the Company's nuclear system compare to the**
19 **industry average?**

20 **A:** As mentioned in the response to the previous question, during the period January
21 1, 2004 through December 31, 2004, the Company's nuclear generation system
22 achieved a net capacity factor of 92.9%. In contrast, the NERC five-year average

1 capacity factor for 1999-2003 for all commercial nuclear generation in North
2 America was 86.0%.

3 For the twelve-month period ending March 31, 2005, the Company's nuclear
4 generation system achieved a net capacity factor of 93.0%. The NERC five-year
5 average capacity factor for 1999-2003 for all commercial nuclear generation in
6 North America was 86.0%. The Company's nuclear system incurred a 1.3% forced
7 outage rate during the fifteen-month period ending March 31, 2005 compared to
8 the industry average of 5.5% for similar size nuclear generators. These
9 performance indicators reflect good nuclear performance and management for the
10 review period.

11 **Q. How did the Company's fossil units perform as compared to the industry?**

12 **A.** Our entire fossil steam generation fleet operated well during the 12 months ending
13 December 31, 2004 and in the first quarter of 2005, achieving equivalent
14 availability factors of 93.69% and 92.08% respectively for these periods. This
15 performance indicator exceeds the most recently published NERC average
16 equivalent availability for coal plants of 84.58%. The NERC average covers the
17 period 1999-2003 and represents the performance of 793 units. Equivalent
18 availability is a more meaningful measure of performance for coal plants than
19 capacity factor because the output of our fossil units varies significantly depending
20 on the level of system load. For the twelve-month period ending December 31,
21 2005, our larger fossil units, Roxboro Units 2, 3, and 4 and Mayo Unit 1, operated
22 at equivalent availabilities of 89.06%, 97.61%, 95.44%, and 98.80%, respectively.
23 As I mentioned earlier, the baseload coal units achieved an average equivalent

1 availability of 95.23%. These performance indicators compare well with the
2 industry average equivalent availability factor of 85.53% for 85 similarly sized
3 fossil units.

4 **Q. How did the Company's hydroelectric units perform during the review**
5 **period?**

6 **A.** The usage of the hydro facilities on the Company's system is limited by the
7 availability of water that can be released through the turbine generators. The
8 Company's hydro plants have very limited ponding capacity for water storage. The
9 Company operates the hydro plants to obtain the maximum generation from them;
10 but because of the small water storage capacity available, the hydro units have been
11 primarily utilized for peaking and regulating purposes. This operation maximizes
12 the economic benefit of the units. The hydroelectric units had an equivalent
13 availability of 97.16% and operated at a capacity factor of 41.69% for the twelve-
14 month period ending December 31, 2004. The hydroelectric units had an average
15 equivalent availability of 98.33% and a capacity factor of 47.73% for the first
16 quarter of 2005. The 5 year industry average for hydroelectric generation as
17 published in NERC's most recent report reflects an average equivalent availability
18 of 88.43% and an average capacity factor of 42.81%. These performance
19 indicators show that the Company managed the hydroelectric facilities well,
20 keeping them almost always available for economic use when water was available.

21 **Q. Are you presenting any exhibits with your testimony?**

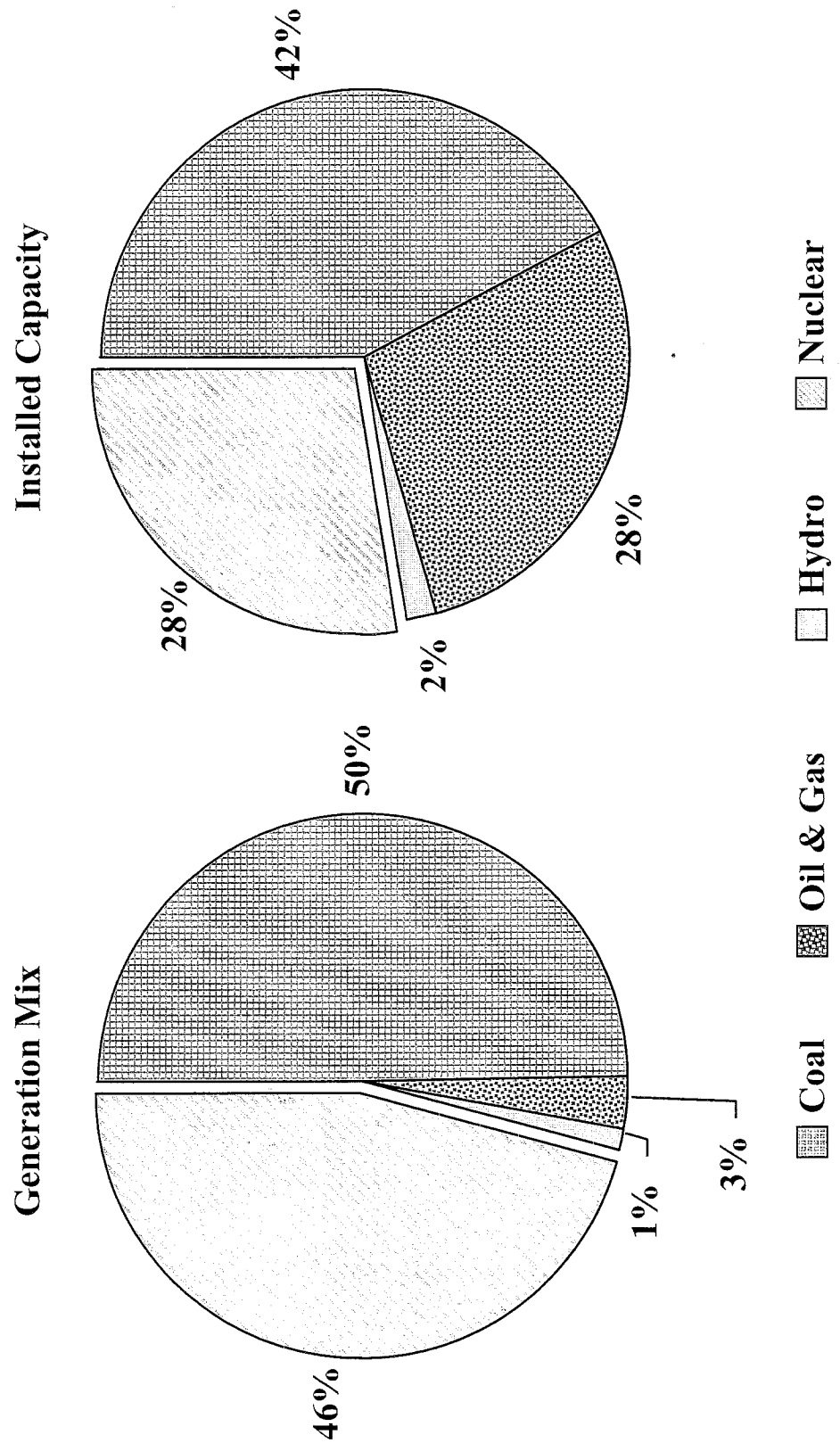
1 **A.** Yes. Roberts Exhibit Nos. 1 and 2 are graphic representations of the Company's
2 generation system operation for the twelve-month period ending December 31,
3 2005 and the first quarter of 2005, respectively.

4 **Q.** **Does this conclude your testimony?**

5 **A.** Yes.

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**Comparison of Progress Energy Carolinas
Installed Generating Capacity
to Actual Generation Mix
January through December 2004**



**Comparison of Progress Energy Carolinas
Installed Generating Capacity
to Actual Generation Mix
January through March 2005**

